

## **CLAIMS**

What is claimed is:

1           1.     A device that allows a user to calculate the length and  
2 diameter of a suitable interventional prosthesis as well as the height  
3 and length of stenosis during the same exploratory procedure, the  
4 device comprising:

5                 an exterior conduit longitudinally extending between  
6 proximal and distal ends, the exterior conduit having  
7 measurement markers formed on a portion thereof;

8                 an interior conduit longitudinally extending between  
9 proximal and distal ends, disposed within the exterior conduit,  
10 and displaceable with respect to the exterior conduit, the  
11 interior conduit having a depth marking mechanism visible  
12 through a portion of the exterior conduit;

13                a measurement assembly comprising at least two legs  
14 having distal and proximal ends and inward facing and lumen  
15 facing surfaces, the legs coupled with each other proximal the  
16 distal ends thereof, the measurement assembly also coupled  
17 about the distal end of the interior conduit;

18                a handle operatively connected with the measurement  
19 assembly, the handle comprising a means for opening and  
20 closing the measurement assembly by actuating the handle  
21 along a continuum between a first closed configuration and a  
22 second open configuration.

1           2.     The device of claim 1, wherein the inward facing surfaces  
2 of the legs are substantially flush with one another when the  
3 measurement assembly is closed.

1        3.        The device of claim 2, wherein when the measurement  
2 assembly is moved distally in relation to the first conduit, the legs form  
3 an acute angle with respect to one another.

1        4.        The device of claim 3, wherein the measurement  
2 assembly further comprises a third leg.

1        5.        The device of claim 1, wherein the distal ends of the legs  
2 are coupled together, wherein measurement of the target site takes  
3 place between the distal and proximal ends thereof.

1        6.        The device of claim 1, wherein the handle further  
2 comprises a measurement indicator, wherein target lumen dimensions  
3 are calculated based on the relative distance the handle travels  
4 along the continuum between the first and second handle locations.

1        7.        A method of measuring a target segment of a lumen of a  
2 patient so as to select a suitable interventional prosthesis, the  
3 method comprising:

4                providing a measuring device having an exterior conduit  
5 longitudinally extending between proximal and distal ends, the  
6 exterior conduit having measurement markers formed on a  
7 portion thereof; an interior conduit longitudinally extending  
8 between proximal and distal ends, disposed within the exterior  
9 conduit, and displaceable with respect to the exterior conduit,  
10 the interior conduit having a depth marking mechanism visible  
11 through a portion of the exterior conduit; a measurement  
12 assembly comprising at least two legs having distal and  
13 proximal ends and inward facing and lumen facing surfaces, the  
14 legs coupled with each other proximal the distal ends thereof,  
15 the measurement assembly also coupled about the distal end

16 of the interior conduit; a handle operatively connected with  
17 the measurement assembly, the handle comprising a means for  
18 opening and closing the measurement assembly by actuating  
19 the handle along a continuum between a first closed  
20 configuration and a second open configuration;

21 introducing the device into an appropriate anatomical  
22 orifice of a patient;

23 delivering the device adjacent a target segment of a  
24 lumen within the patient; and

25 measuring the length of the target segment of the lumen  
26 within the patient.

1 8. The method of claim 7, wherein the device further  
2 comprises an optical scope operatively coupled therewith, such that  
3 the measuring step is accomplished using the optical scope.

1 9. The method of claim 7, wherein the inward facing surfaces  
2 of the legs are substantially flush with one another when the  
3 measurement assembly is closed.

1 10. The method of claim 9, wherein when the measurement  
2 assembly is moved distally in relation to the first conduit, the legs form  
3 an acute angle with respect to one another.

1 11. The method of claim 10, wherein the measurement  
2 assembly further comprises a third leg.

1 12. The method of claim 7, wherein the distal ends of the legs  
2 are coupled together, wherein measurement of the target site takes  
3 place between the distal and proximal ends thereof.

1        13. The method of claim 7, wherein the handle further  
2 comprises a measurement indicator, wherein target lumen dimensions  
3 are calculated based on the relative distance the handle travels  
4 along the continuum between the first and second handle locations.

1        14. The method of claim 7, further comprising the step of  
2 measuring the diameter of the target segment of the lumen within the  
3 patient.

1        15. The method of claim 14, wherein the diameter measuring  
2 step comprises the step of actuating the handle along the continuum  
3 from the first closed configuration toward the second open  
4 configuration until the legs of the measurement mechanism come in  
5 contact with the target segment of the lumen and calculating the  
6 length as a function of the number of leg measurement markings distal  
7 the exterior conduit.

1        16. The method of claim 14, wherein the target segment of  
2 the lumen is stenotic.

1        17. The method of claim 7, wherein the device further  
2 comprises an optical scope operatively coupled therewith, such that  
3 the measuring step is accomplished using the optical scope.

1        18. The method of claim 16, further comprising the step of  
2 measuring the length of the stenosis.

1        19. The method of claim 18, wherein the delivering step  
2 further comprises the step of positioning the distal end of the first  
3 conduit distal the stenosis.

1        20. The method of claim 19, wherein the measurement  
2 mechanism is opened and placed distal the stenosis such that the  
3 exterior conduit is retracted and the stenosis length measurement is a  
4 function of the distance the exterior conduit is retracted proximally.

1        21. The method of claim 18, wherein the stenosis length  
2 measuring step comprises the step of actuating the handle along the  
3 continuum from the first closed configuration toward the second  
4 open configuration until the legs of the measurement mechanism  
5 come in contact with the target segment of the lumen and  
6 calculating the length as a function of the distance between the first  
7 handle position and the current point of the handle along the  
8 continuum.

1        22. The method of claim 16, further comprising the step of  
2 measuring the height of the stenosis.

1        23. The method of claim 22, further comprising the step of  
2 measuring the length of the stenosis.

1        24. A method of measuring a target segment of a lumen of a  
2 patient so as to select a suitable interventional prosthesis, the  
3 method comprising:

4                providing a measuring device having an exterior conduit  
5 longitudinally extending between proximal and distal ends, the  
6 exterior conduit having measurement markers formed on a  
7 portion thereof; an interior conduit longitudinally extending  
8 between proximal and distal ends, disposed within the exterior  
9 conduit, and displaceable with respect to the exterior conduit,  
10 the interior conduit having a depth marking mechanism visible  
11 through a portion of the exterior conduit; a measurement

12 assembly comprising four legs having distal and proximal ends  
13 and inward facing and lumen facing surfaces, the legs coupled  
14 with each other proximal the distal ends thereof, the  
15 measurement assembly also coupled about the distal end of  
16 the interior conduit; a handle operatively connected with the  
17 measurement assembly, the handle comprising a means for  
18 opening and closing the measurement assembly by actuating  
19 the handle along a continuum between a first closed  
20 configuration and a second open configuration;

21 introducing the device into an appropriate anatomical  
22 orifice of a patient;

23 delivering the device adjacent a target segment of a  
24 lumen within the patient; and

25 measuring the diameter of the target segment of the  
26 lumen within the patient.

1 25. A device that allows a user to calculate the length and  
2 diameter of a suitable interventional prosthesis as well as the height  
3 and length of stenosis during the same exploratory procedure, the  
4 device comprising:

5 a diameter measurement balloon comprising substantially  
6 flat distal and proximal surfaces, with a substantially circular  
7 edge there between, the diameter measuring balloon having  
8 diameter measurement markers on the proximal and/or distal  
9 surface thereof;

10 a dilation balloon that has a substantially cylindrical  
11 shape with proximal and distal ends;

12 a plurality of conduits, a diameter measurement conduit  
13 for inflating the diameter measurement balloon, a dilation

14 conduit for inflating the dilation balloon and an outermost  
15 conduit, the outermost conduit having proximal and distal ends  
16 and measurement markings there between, the diameter  
17 measurement conduit and the dilation conduit disposed within  
18 the outermost conduit such that the dilation balloon and the  
19 diameter measurement balloon are coupled along the  
20 outermost conduit yet operatively coupled with the dilation  
21 and measurement conduits, respectively through the outermost  
22 conduit.

1 26. The device of claim 25, wherein the plurality of conduits  
2 are co-extruded.

1 27. A method of measuring a target segment of a lumen of a  
2 patient so as to select a suitable interventional prosthesis, the  
3 method comprising:

4 providing a measuring device having a diameter  
5 measurement balloon comprising a substantially flat distal and  
6 proximal surfaces, with a substantially circular edge there  
7 between, the diameter measuring balloon having diameter  
8 measurement markers on the proximal and/or distal surface  
9 thereof; a dilation balloon that has a substantially cylindrical  
10 shape with proximal and distal ends; a plurality of conduits, a  
11 diameter measurement conduit for inflating the diameter  
12 measurement balloon, a dilation conduit for inflating the  
13 dilation balloon and an outermost conduit, the outermost  
14 conduit having proximal and distal ends and measurement  
15 markings there between, the diameter measurement conduit  
16 and the dilation conduit disposed within the outermost conduit  
17 such that the dilation balloon and the diameter measurement



18 balloon are coupled along the outermost conduit yet  
19 operatively coupled with the dilation and measurement  
20 conduits, respectively through the outermost conduit;

21 introducing the device into an appropriate anatomical  
22 orifice of a patient;

23 delivering the device adjacent a target segment of a  
24 lumen within the patient; and

25 measuring the specific dimensions of the target segment  
26 of the lumen within the patient.

1 28. The method of claim 27, wherein the device further  
2 comprises an optical scope operatively coupled therewith, such that  
3 the measuring step is accomplished using the optical scope.

1 29. The method of claim 27, wherein the target segment of  
2 the lumen is stenotic.

1 30. The method of claim 29, wherein the specific dimensions  
2 of the target segment is selected from the group consisting of length,  
3 height, circumference, radius, diameter and combinations thereof.

1 31. A device that allows a user to calculate the length and  
2 diameter of a suitable interventional prosthesis as well as the height  
3 and length of stenosis during the same exploratory procedure, the  
4 device comprising:

5 a diameter measurement balloon comprising substantially  
6 flat distal and proximal surfaces, with a substantially circular  
7 edge there between, the diameter measuring balloon having  
8 diameter measurement markers on the proximal and/or distal  
9 surface thereof;



10 a dilation balloon that has a substantially cylindrical  
11 shape with proximal and distal ends;

12 a tube having an interior and an exterior, the interior  
13 defining three apertures passing at least partially there through,  
14 the first aperture comprising a diameter measurement conduit  
15 for inflating the diameter measurement balloon, the second  
16 aperture comprising a dilation conduit for inflating the dilation  
17 balloon and a third aperture that extends the length thereof,  
18 the third aperture comprising a working channel, the diameter  
19 measurement conduit and the dilation conduit disposed within  
20 the tube conduit such that the dilation balloon and the  
21 diameter measurement balloon are coupled along the exterior  
22 of the tube yet operatively coupled with the dilation and  
23 measurement conduits, respectively through the outermost  
24 conduit.

1 32. A method of measuring a target segment of a lumen of a  
2 patient so as to select a suitable interventional prosthesis, the  
3 method comprising:

4 providing a measuring device having a diameter  
5 measurement balloon comprising a substantially flat distal and  
6 proximal surfaces, with a substantially circular edge there  
7 between, the diameter measuring balloon having diameter  
8 measurement markers on the proximal and/or distal surface  
9 thereof; a dilation balloon that has a substantially cylindrical  
10 shape with proximal and distal ends; a tube having an interior  
11 and an exterior, the interior defining three apertures passing at  
12 least partially there through, the first aperture comprising a  
13 diameter measurement conduit for inflating the diameter

14 measurement balloon, the second aperture comprising a  
15 dilation conduit for inflating the dilation balloon and an third  
16 aperture that extends the length thereof, the third aperture  
17 comprising a working channel, the diameter measurement  
18 conduit and the dilation conduit disposed within the tube  
19 conduit such that the dilation balloon and the diameter  
20 measurement balloon are coupled along the exterior of the  
21 tube yet operatively coupled with the dilation and  
22 measurement conduits, respectively through the outermost  
23 conduit;

24 introducing the device into an appropriate anatomical  
25 orifice of a patient;

26 delivering the device adjacent a target segment of a  
27 lumen within the patient; and

28 measuring the specific dimensions of the target segment  
29 of the lumen within the patient.

1 33. The method of claim 32, wherein the device further  
2 comprises an optical scope operatively coupled therewith, such that  
3 the measuring step is accomplished using the optical scope.

1 34. The method of claim 32, wherein the target segment of  
2 the lumen is stenotic.

1 35. The method of claim 34, wherein the specific dimensions  
2 of the target segment is selected from the group consisting of length,  
3 height, circumference, radius, diameter and combinations thereof.

1 36. The device of claim 35, wherein the tube further  
2 comprises proximal and distal ends and measurement markings there  
3 between.

1        37. A device that allows a user to calculate the length and  
2 diameter of a suitable interventional prosthesis as well as the height  
3 and length of stenosis during the same exploratory procedure, the  
4 device comprising:

5            an exterior conduit longitudinally extending between  
6 proximal and distal ends, the exterior conduit having  
7 measurement markers formed on a portion thereof;

8            an interior conduit longitudinally extending between  
9 proximal and distal ends, disposed within the exterior conduit,  
10 and displaceable with respect to the exterior conduit;

11           a measurement assembly comprising a plurality of legs  
12 having distal and proximal ends and inward facing and lumen  
13 facing surfaces, the legs coupled with each other proximal the  
14 distal ends thereof, the measurement assembly also coupled  
15 about the distal end of the interior conduit;

16           a handle operatively connected with the measurement  
17 assembly, the handle comprising a means for opening and  
18 closing the measurement assembly by actuating the handle  
19 along a continuum between a first closed configuration and a  
20 second open configuration.

21        38. The device of claim 37, wherein the inward facing  
22 surfaces of the legs are substantially flush with one another when the  
23 measurement assembly is closed.

1        39. The device of claim 38, wherein when the measurement  
2 assembly is moved distally in relation to the first conduit, the legs form  
3 an acute angle with respect to one another.

1        40. The device of claim 39, wherein the measurement  
2 assembly comprises four legs.

1        41. The device of claim 37, wherein the distal ends of the legs  
2 are coupled together, wherein measurement of the target site takes  
3 place between the distal and proximal ends thereof.

1        42. The device of claim 37, wherein the handle further  
2 comprises a measurement indicator, wherein target lumen dimensions  
3 are calculated based on the relative distance the handle travels  
4 along the continuum between the first and second handle locations.

